

**REMARKS**

Claims 61, 84, 89, 92, 99 and 111 have been amended. Claims 83, 90 and 110 have been canceled. Claim 144-148 have been added. Claims 61-82, 84-89, 91-109, 111-119 and 144-148 are now pending. A Submission of Replacement Sheets of Drawings (FIGS. 1-5) is being concurrently filed herewith. Applicant reserves the right to pursue the original claims and other claims in this and other applications. Applicant respectfully requests reconsideration of the above-referenced application in light of the amendments and following remarks.

At the outset, Applicant respectfully notes that claims 64-72, 77-82, 84-88, 90-92, 100-106, 110-112 and 116-119 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2004/0042259 ("Campbell, et al."). Similarly, claim 83 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Campbell, et al., in view of U.S. Patent No. 6,084,796 ("Kozicki").

Applicant respectfully submits that Campbell, et al., is *not* a proper prior art reference for purposes of a 35 U.S.C. § 103(a) rejection. The present application was filed on January 28, 2004. Campbell, et al., was filed on August 29, 2002, and published on March 4, 2004. As a result, Campbell, et al., qualifies as prior art only under 35 U.S.C. § 102(e).

The subject matter of Campbell, et al., and of the claimed invention were, at the time the invention was made, subject to an obligation of assignment to the same entity: Micron Technology, Inc. The Assignment for this application was recorded in the PTO on January 28, 2004, on Reel 014945, Frame 838. The Assignee of Campbell, et al., is also Micron Technology, Inc. A copy of that Assignment was recorded in the PTO on August 29, 2002, on Reel 013237, Frame 413. Therefore, section 35 U.S.C. § 103(c) is applicable.

According to MPEP § 706.02(l)(1), “[e]ffective November 29, 1999, subject matter which was prior art under former 35 U.S.C. 103 via 35 U.S.C. 102(e) is now disqualified as prior art against the claimed invention if that subject matter and the claimed invention ‘were, at the time the invention was made, . . . subject to an obligation of assignment to the same person.’” Accordingly, Campbell, et al., is not a valid prior art reference and should be excluded under 35 U.S.C. § 103.

For at least these reasons, claims 64-72, 77-88, 90-92, 100-106, 110-112 and 116-119, should be in immediate condition for allowance over the prior art of record since Campbell, et al., is not a proper prior art reference under 35 U.S.C. § 103(a). The subject matter of dependent claim 83 has been incorporated into independent claim 61. The subject matter of dependent claim 90 has been incorporated into independent claim 89. Similarly, the subject matter of dependent claim 110 has been incorporated into independent claim 99. These dependent claims, *i.e.*, claims 83, 90, and 110 have been canceled. Claims 84, 92 and 111 were amended to maintain proper dependency. Independent claims 61, 89 and 99 are believed to be in immediate condition for allowance.

Claims 61, 73, 89, 93, 99 and 107 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 6,084,796 (Kozicki et al.). The rejection is respectfully traversed.

As indicated above, independent claims 61, 89 and 99 have been amended. Claim 61 now recites a method of forming a memory element comprising, *inter alia*, “forming at least one resistance variable material layer; forming at least one metal-containing layer . . . and forming at least one conducting channel . . . by applying a

conditioning voltage . . . [which] has a pulse duration of from about 10 to about 500 ns and is approximately 700 mV or greater.”

Claim 89 now recites a method of forming a memory element comprising, “forming at least one doped chalcogenide glass layer with polarizable metal-chalcogen regions within a glass backbone, wherein said polarizable metal-chalcogen regions are silver-selenide regions; electrically coupling first and second electrodes to said doped chalcogenide glass layer; and polarizing said metal-chalcogen regions with a conditioning voltage applied to said electrodes to form at least one conducting channel comprising said polarized metal-chalcogen regions, said conducting channel configured to receive and expel metal ions in response to write and erase voltages applied to said memory element.”

Claim 99 now recites a method of forming a memory element comprising, “forming at least one chalcogenide glass layer; forming at least one metal-containing layer over said chalcogenide glass layer; forming a second metal-containing layer over the first metal-containing layer; electrically coupling first and second electrodes to said chalcogenide glass layer; and applying a conditioning pulse to the memory element to bond regions of metal and glass within said chalcogenide glass layer, said bonded regions forming at least one conducting channel within said chalcogenide glass layer.”

Kozicki relates to a programmable metallization cell. The programmable metallization cell of Kozicki does not have polarizable metal-chalcogenide regions. In the present invention, a conditioning voltage is applied to polarizable metal-chalcogenide regions to form conducting channels having polarized metal-chalcogenide regions. Kozicki does not disclose “forming at least one conducting channel. . . by applying a conditioning voltage . . . [which] has a pulse duration of from about 10 to about 500 ns and is approximately 700 mV or greater,” as recited in claim 61 (emphasis

added), or “forming at least one doped chalcogenide glass layer with *polarizable metal-chalcogen regions . . . [that] are silver-selenide regions*,” as recited in claim 89 (emphasis added), or “bonding regions forming at least one conducting channel within said chalcogenide glass layer,” as recited in claim 99. Instead Kozicki discloses forming a retractable dendrite. Specifically, in Kozicki the dendrites grow from the electrode connected to the negative power supply to a second electrode when a voltage is applied. A dendrite is retracted by reversing the voltage of the electrodes. However, as previously noted, the Kozicki does not teach forming conducting channels within a chalcogenide glass layer by applying a conditioning voltage to polarizable regions. As Kozicki does not teach all of the limitations of independent claims 61, 89, and 99, the Applicant respectfully requests withdrawal of the rejection.

Claim 73 depends from claim 61 and should be similarly allowable along with claim 61 for at least the reasons provided above with regard to 61. Claim 93 depends from claim 89 and should be similarly allowable along with claim 89 for at least the reasons provided above with regard to 89. Claim 107 depends from claim 99 and should be similarly allowable along with claim 99 for at least the reasons provided above with regard to 99. Consequently, the § 102(b) rejection of claims 61, 73, 89, 93, 99 and 107 should be withdrawn.

Claims 74-76, 94, 95 and 108-109 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kozicki. The rejection is respectfully traversed.

Claims 74-76 depend from claim 61 and should be similarly allowable along with claim 61 for at least the reasons provided above with regard to 61. Claims 94-95 depend from claim 89 and should be similarly allowable along with claim 89 for at least the reasons provided above with regard to 89. Claims 108-109 depend from claim 99

and should be similarly allowable along with claim 99 for at least the reasons provided above with regard to 99.

Specifically, Kozicki does not disclose or suggest "forming at least one conducting channel. . . by applying a conditioning voltage . . . [which] has a pulse duration of from about 10 to about 500 ns and is approximately 700 mV or greater," as recited in claim 61 (emphasis added), or "forming at least one doped chalcogenide glass layer with *polarizable metal-chalcogen regions . . . [that] are silver-selenide regions*," as recited in claim 89 (emphasis added), or "bonding regions forming at least one conducting channel within said chalcogenide glass layer," as recited in claim 99. Consequently, the § 103(a) rejection of claims 74-76, 94, 95 and 108-109 should be withdrawn.

Claims 61-63, 89, 96-99 and 113-115 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Campbell, et al. The rejection is respectfully traversed.

As indicated above, independent claims 61, 89 and 99 have been amended. Claim 61 now recites a method of forming a memory element comprising, *inter alia*, "forming at least one resistance variable material layer; forming at least one metal-containing layer . . . and forming at least one conducting channel . . . by applying a conditioning voltage . . . [which] has a pulse duration of from about 10 to about 500 ns and is approximately 700 mV or greater."

Claim 89 now recites a method of forming a memory element comprising, "forming at least one doped chalcogenide glass layer with polarizable metal-chalcogen regions within a glass backbone, wherein said polarizable metal-chalcogen regions are silver-selenide regions; electrically coupling first and second electrodes to said doped chalcogenide glass layer; and polarizing said metal-chalcogen regions with a

conditioning voltage applied to said electrodes to form at least one conducting channel comprising said polarized metal-chalcogen regions, said conducting channel configured to receive and expel metal ions in response to write and erase voltages applied to said memory element."

Claim 99 now recites a method of forming a memory element comprising, "forming at least one chalcogenide glass layer; forming at least one metal-containing layer over said chalcogenide glass layer; forming a second metal-containing layer over the first metal-containing layer; electrically coupling first and second electrodes to said chalcogenide glass layer; and applying a conditioning pulse to the memory element to bond regions of metal and glass within said chalcogenide glass layer, said bonded regions forming at least one conducting channel within said chalcogenide glass layer."

The Office Action asserts that limitations of independent claims 61, 89 and 99 are inherently taught by Campbell. The Office Action does not "provide a basis in fact and/or technical reasoning ... to support the determination that the allegedly inherent characteristic necessarily flows from teachings of the applied prior art" (emphasis original). MPEP §2112 (IV). Furthermore, Campbell, et al., does not disclose "forming at least one conducting channel. . . by applying a conditioning voltage . . . [which] has a pulse duration of from about 10 to about 500 ns and is approximately 700 mV or greater," as recited in claim 61 (emphasis added), or "forming at least one doped chalcogenide glass layer with *polarizable metal-chalcogen regions . . . [that] are silver-selenide regions*," as recited in claim 89 (emphasis added), or "forming a second metal-containing layer over [a] first metal-containing layer," as recited in claim 99. Applicant respectfully requests withdrawal of the rejection of independent claims 61, 89 and 99.

Claims 62-63 depend from claim 61 and should be similarly allowable along with claim 61 for at least the reasons provided above with regard to 61. Claims 96-98

depend from claim 89 and should be similarly allowable along with claim 89 for at least the reasons provided above with regard to 89. Claims 113-115 depend from claim 99 and should be similarly allowable along with claim 99 for at least the reasons provided above with regard to 99. Consequently, the § 102(e) rejection of claims 61-63, 89, 96-99 and 113-115 should be withdrawn.

Claim 83 stands rejected under 35 U.S.C. § 103 as being unpatentable over Campbell, et al., in view of Kozicki. The rejection is respectfully traversed.

Claim 83 has been canceled since its subject matter has been incorporated into independent claim 61. Moreover, as indicated above, Campbell, et al., is not a proper reference for purposes of a 35 U.S.C. § 103 rejection. The present application and Campbell, et al., were, at the same time the present invention was made, owned by, or subject to an obligation of assignment to, Micron Technology, Inc. Therefore, any rejection under 35 U.S.C. § 103 should be withdrawn.

Applicant also respectfully submits that the prior art of record does not disclose or suggest the subject matter of newly added independent claims 144-145. Specifically, the cited prior art does not teach or suggest a method of forming a memory element comprising, "forming at least one resistance variable material layer; forming at least one metal-containing layer over said resistance variable material layer; and forming at least one conducting channel within said resistance variable material layer by applying a conditioning voltage to the memory element, wherein said conducting channel receives and expels conductive ions upon application of a voltage different from said conditioning voltage," as recited in claim 144 or "forming at least one chalcogenide glass layer; forming at least one Ag<sub>2</sub>Se layer over said chalcogenide glass layer; and applying a conditioning voltage to the memory element sufficient to cause Ag<sub>2</sub>Se molecules to enter into said chalcogenide glass layer and bond with molecules of

said chalcogenide glass layer," as recited in claim 145. At best, the cited references merely disclose forming an electrodeposit of metal ions; but, do not teach or suggest applying a voltage sufficient to cause  $\text{Ag}_2\text{Se}$  molecules to enter into the chalcogenide layer and bond to the molecules in the chalcogenide layer.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to review and pass this application to issue.

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Respectfully submitted,

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